

Appln. No. 10/657,054

Amendment dated: January 24, 2005

Response to Office Action dated: Nov. 30, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method for forming an inductor, comprising:
forming in a ceramic substrate a first plurality of conductive vias radially spaced a first distance from a central axis so as to define an inner circumference;
forming in said ceramic substrate a second plurality of conductive vias radially spaced a second distance about said central axis so as to define an outer circumference;
forming a first plurality of conductive traces disposed in a first plane defined orthogonal to said central axis, said first plurality of conductive traces forming an electrical connection between substantially radially adjacent ones of said first and second plurality of conductive vias;
forming a second plurality of conductive traces disposed in a second plane spaced from said first plane and defined orthogonal to said central axis to define an electrical connection between circumferentially offset ones of said first and second plurality of conductive vias to define a three dimensional toroidal coil.
2. (Original) The method according to claim 1 further comprising the step of firing said ceramic substrate after said conductive vias and said traces have been formed.
3. (Original) The method according to claim 2, further comprising the step of forming at least a toroid shaped core region of said ceramic substrate, defined within said toroidal coil, of a ceramic material having at least one electrical characteristic different from at least one other portion of said ceramic substrate.
4. (Original) The method according to claim 3, further comprising the step of selecting said electrical characteristic to be a permeability.

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5. (Original) The method according to claim 4, further comprising the step of selecting said permeability of said toroid shaped core region to be greater than one.
6. (Original) The method according to claim 3 wherein said ceramic material is a low-temperature co-fired ceramic (LTCC) material.
7. (Original) The method according to claim 1, further comprising the step of forming said ceramic substrate by stacking a plurality of unfired ceramic layers, and selecting at least one of said unfired ceramic layers to have a permeability greater than one.
8. (Original) The method according to claim 7 further comprising the step of positioning said at least one ceramic layer having a permeability greater than one to be at least partially contained within a toroid shaped core region of said ceramic substrate, defined within said toroidal coil.
9. (Original) The method according to claim 1 further comprising the steps of :
 - forming a third plurality of conductive vias radially spaced a third distance from said central axis so as to define an second inner circumference, said third distance less than said first distance;
 - forming in said ceramic substrate a fourth plurality of conductive vias radially spaced a fourth distance about said central axis so as to define a second outer circumference, said fourth distance larger than said second distance;
 - forming a third plurality of conductive traces disposed in a third plane defined orthogonal to said central axis, said third plurality of conductive traces forming an electrical connection between substantially radially adjacent ones of said third and fourth plurality of conductive vias;
 - forming a fourth plurality of conductive traces disposed in a fourth plane spaced from said first plane and defined orthogonal to said central axis to define an electrical connection between circumferentially offset ones of said third and fourth plurality of

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conductive vias to define a second three dimensional toroidal coil.

10. (Original) The method according to claim 9 further comprising the step of forming an electrical connection between the first and second three-dimensional conductive toroidal coils.

11. (Original) The method according to claim 10 further comprising the step of configuring said electrical connection so that the first and second toroidal coils generate a magnetic field in a common direction.

12.- 29. (cancelled)

30. (Original) A method for forming an inductor in a ceramic substrate, comprising the steps of:

forming a conductive coil comprising a plurality of turns about an unfired ceramic toroidal core region defined within an unfired ceramic substrate; and

co-firing said ceramic toroidal core region, said ceramic substrate, and said conductive coil to form an integral ceramic substrate structure with said conductive coil at least partially embedded therein.

31. (Original) The method according to claim 30, further comprising the step of forming said ceramic toroidal core region of a ceramic material having a permeability greater than one.

32. (Original) The method according to claim 30 further comprising the step of disposing a conductive ground plane layer between said conductive coil and an outer surface of said ceramic substrate.

33. (Original) The method according to claim 30 further comprising the step of forming said conductive coil with a plurality of winding layers, each winding layer defining a toroidal coil disposed about said ceramic toroidal core and having a coil
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radius different from an adjacent winding layer.

34. (Cancelled)

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